

I CLAIM:

1. A storage system, comprising:
 - a host interface for receiving input/output ("I/O") transactions from a host device, said I/O transactions complying with a first interface protocol;
 - 5 a storage device interface for transmitting I/O transactions to a plurality of storage devices according to a second interface protocol; and
 - 10 an interface adapter coupled to the host interface and the storage device interface, wherein said interface adapter is configured to receive I/O transactions from the host interface, to convert the I/O transactions from the first interface protocol to the second interface protocol, and to transmit the converted I/O transactions to the storage device interface, and said interface adapter is further configured to receive I/O transactions from the storage device interface, to convert the I/O transactions from the storage device interface from the second interface protocol to the first interface protocol, and to transmit the converted I/O transactions to the host interface.
2. The storage system of Claim 1, wherein:
 - the second interface protocol is an IDE/ATA interface protocol.
3. The storage system of Claim 1, wherein:
 - the first interface protocol is a SCSI interface protocol.
4. The storage system of Claim 1, wherein:
 - the first interface protocol is a Fibre Channel interface protocol.
- 25 5. The storage system of Claim 1, wherein:
 - said interface adapter is configured to receive a first plurality of frames corresponding to an I/O transaction generated by the host device, wherein said interface adapter is configured to convert said first plurality of frames into a plurality of register inputs and a command input corresponding to said I/O transaction, wherein said interface adapter is configured to cause said plurality of register inputs to be

15
20
25

loaded into a plurality of registers on one of said plurality of storage devices, and wherein said interface adapter is configured to cause said command input to be loaded into a command register on said one of said plurality of storage devices.

5 6. The storage system of claim 5, wherein said first plurality of frames arrive at said interface adapter in a serial format, and wherein said interface adapter is configured to deserialize said first plurality of frames.

10 7. The storage system of claim 5, wherein:
said interface adapter includes a first receive buffer and a first transmit buffer coupled to the host interface, and said interface adapter further includes a second receive buffer and a second transmit buffer coupled to the storage device interface, wherein said first plurality of frames is received in said first receive buffer, and wherein said plurality of register inputs is received in said second transmit buffer prior to being loaded into said plurality of registers.

15 8. The storage system of claim 5, wherein:
said interface adapter is configured to receive a plurality of register outputs from the storage device interface, convert said plurality of register outputs to a second plurality of frames, and convey said second plurality of frames to said host interface.

20 9. The storage system of Claim 1, wherein:
said interface adapter includes a state machine configured to receive a plurality of frames corresponding to an I/O transaction from said host interface, wherein said state machine is configured to convert said plurality of frames into a plurality of register inputs and a command input corresponding to said I/O transaction, wherein said state machine is configured to cause said plurality of register inputs to be loaded into a plurality of registers on one of the plurality of storage devices, and wherein said state machine is configured to cause said command input to be loaded into a command register on said one of the plurality of storage devices.

25 30

10. The storage system of Claim 9, wherein said plurality of frames arrive at said state machine in a serial format, and wherein said state machine is configured to deserialize said plurality of frames.

5

11. The storage system of Claim 9, further comprising:
a first receive buffer coupled to said host interface;
a first transmit buffer coupled to said host interface;
a second receive buffer coupled to said storage device interface; and
10 a second transmit buffer coupled to said storage device interface;
wherein said plurality of frames is received in said first receive buffer, and said plurality of register inputs is received in said second transmit buffer prior to being loaded into said plurality of registers.

15
20
25

12. A method of operating a storage system, comprising:
receiving I/O transactions from a host device, said I/O transactions complying with a first interface protocol, said first interface protocol being a SCSI interface protocol or a Fibre Channel interface protocol;
converting the I/O transactions from the first interface protocol to a second interface protocol; and
transmitting the I/O transactions to a storage device having an interface complying with the second interface protocol, said second interface protocol being an IDE/ATA interface protocol.

25

13. The method of Claim 12, wherein:
said receiving I/O transactions from the host device comprises receiving a first plurality of frames corresponding to an I/O transaction generated by the host device;
said converting the I/O transactions from the first interface protocol to the second interface protocol comprises converting said first plurality of frames into a
30

plurality of register inputs and a command input corresponding to said I/O transaction; and

said transmitting the I/O transactions to the storage device comprises:

5 loading said plurality of register inputs into a plurality of registers on the storage device; and

loading said command input into a command register on one of said plurality of storage devices.

14. The method of claim 13, wherein:

10 said receiving the first plurality of frames comprises receiving the first plurality of frames in a serial format, and

said converting the I/O transactions from the first interface protocol to the second interface protocol comprises deserializing said first plurality of frames.

15. The method of claim 13, further comprising:

in response to the command input being loaded into the command register of the storage device, executing an operation on the storage device corresponding to said I/O transaction.

20 16. A storage system, comprising:

a host interface for receiving input/output ("I/O") transactions from a host device, said I/O transactions complying with a first interface protocol;

25 a plurality of storage devices configured to receive I/O transactions according to a second interface protocol; and

30 an interface adapter coupled to the host interface and the plurality of storage devices, wherein said interface adapter is configured to receive I/O transactions from the host interface, to convert the I/O transactions from the first interface protocol to the second interface protocol, and to transmit the converted I/O transactions to one of the plurality of storage devices, and said interface adapter is further configured to receive I/O transactions from the plurality of storage devices, to

convert the I/O transactions from the plurality of storage devices from the second interface protocol to the first interface protocol, and to transmit the converted I/O transactions to the host interface.

5 17. The storage system of Claim 16, wherein:
the second interface protocol is an IDE/ATA interface protocol.

10 18. The storage system of Claim 16, wherein:
the first interface protocol is a SCSI interface protocol.

19. The storage system of Claim 16, wherein:
the first interface protocol is a Fibre Channel interface protocol.

20. The storage system of Claim 16, wherein:
each of said plurality of storage devices includes a plurality of registers and a command register; and
said interface adapter is configured to receive a first plurality of frames corresponding to an I/O transaction generated by the host device, wherein said interface adapter is configured to convert said first plurality of frames into a plurality of register inputs and a command input corresponding to said I/O transaction, wherein said interface adapter is configured to cause said plurality of register inputs to be loaded into the plurality of registers on one of said plurality of storage devices, and wherein said interface adapter is configured to cause said command input to be loaded into the command register on said one of said plurality of storage devices.

25 21. The storage system of claim 20, wherein said first plurality of frames arrive at said interface adapter in a serial format, and wherein said interface adapter is configured to deserialize said first plurality of frames.

22. The storage system of claim 20, wherein each of said plurality of storage devices is configured to execute an operation corresponding to said I/O transaction in response to said command input being loaded into said command register of said one of said plurality of storage devices.

5

23. The storage system of claim 20, further comprising:
a storage device interface provided in the interface adapter for communicating with the plurality of storage devices;
wherein said interface adapter includes a first receive buffer and a first transmit buffer coupled to the host interface, and said interface adapter further includes a second receive buffer and a second transmit buffer coupled to the storage device interface, wherein said first plurality of frames is received in said first receive buffer, and wherein said plurality of register inputs is received in said second transmit buffer prior to being loaded into said plurality of registers.

10

24. The storage system of claim 20, wherein:
one of said plurality of storage devices is configured to generate a plurality of register outputs corresponding to said I/O transaction; and
said interface adapter is configured to receive said plurality of register outputs from said one of said plurality of storage devices, convert said plurality of register outputs to a second plurality of frames, and convey said second plurality of frames to said host interface.

15

25. The storage system of Claim 16, wherein:
each of said plurality of storage devices includes a plurality of registers and a command register; and
said interface adapter includes a state machine configured to receive a plurality of frames corresponding to an I/O transaction from said host interface, wherein said state machine is configured to convert said plurality of frames into a plurality of register inputs and a command input corresponding to said I/O transaction,
wherein said state machine is configured to cause said plurality of register inputs

20

25

30

to be loaded into the plurality of registers on one of the plurality of storage devices, and wherein said state machine is configured to cause said command input to be loaded into the command register on said one of the plurality of storage devices.

5

26. The storage system of Claim 25, wherein said plurality of frames arrive at said state machine in a serial format, and wherein said state machine is configured to deserialize said plurality of frames.

10 27. The storage system of Claim 25, further comprising:
a storage device interface provided between the interface adapter and the plurality of
storage devices;
a first receive buffer coupled to said host interface;
a first transmit buffer coupled to said host interface;
a second receive buffer coupled to said storage device interface; and
a second transmit buffer coupled to said storage device interface;
wherein said plurality of frames is received in said first receive buffer, and said plurality
of register inputs is received in said second transmit buffer prior to being loaded
into said plurality of registers.

15
20
25
30

28. An apparatus comprising:
a host device coupled to a first connection device;
a plurality of bus devices coupled to a second connection device;
an interface adapter, wherein said interface adapter includes a first interface coupled to
said first connection device and a second interface coupled to said second
connection device;
wherein said interface adapter is configured to receive a first plurality of frames
corresponding to an input/output (I/O) transaction generated by said host device,
wherein interface adapter is configured to convert said first plurality of frames
into a plurality of register inputs and a command input corresponding to said I/O
transaction, wherein said interface adapter is configured to cause said plurality of

register inputs to be loaded into a plurality of registers on each of said plurality of bus devices, and wherein said interface adapter is configured to cause said command input to be loaded into a command register on each of said plurality of bus devices.

5

29. An apparatus comprising:

- a first interface;
- a second interface; and
- a state machine coupled to said first interface and said second interface;

wherein said state machine is configured to receive a plurality of frames corresponding to a input/output (I/O) transaction from said first interface, wherein said state machine is configured to convert said plurality of frames into a plurality of register inputs and a command input corresponding to said I/O transaction, wherein said state machine is configured to cause said plurality of register inputs to be loaded into a plurality of registers on a device coupled to said second interface, and wherein said state machine is configured to cause said command input to be loaded into a command register on said device.

10

30. A computer system comprising:

- an array controller coupled to a first connection device;
- at least one server computer coupled to said array controller;
- a plurality of bus devices coupled to a second connection device; and
- an interface adapter coupled to said first connection device and said second connection device;

wherein said at least one server computer is configured to generate an input/output (I/O) transaction, wherein said array controller is configured to receive said I/O transaction and generate a first plurality of frames corresponding to said input/output (I/O) transaction, wherein said interface adapter is configured to receive said first plurality of frames, wherein interface adapter is configured to convert said first plurality of frames into a plurality of register inputs and a command input corresponding to said I/O transaction, wherein said interface

25

30

adapter is configured to cause said plurality of register inputs to be loaded into a plurality of registers on each of said plurality of bus devices, and wherein said interface adapter is configured to cause said command input to be loaded into a command register on each of said plurality of bus devices.